

# NEWS REPORT

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## Committee on Sanitary Engineering and Environment

ABEL WOLMAN, *Chairman*

IN JULY 1942, the Office of the Surgeon General of the Department of the Army requested the National Academy of Sciences—National Research Council to establish an advisory committee in the field of sanitary engineering. The request pointed out that the widespread military activities of the United States had presented many new problems requiring the application of engineering procedures designed to protect health. It specifically mentioned the problems of water supply control, proper waste disposal, eradication of insect vectors of disease, and the need for assistance in the procurement and training of sanitary engineers. Within the month, the Division of Medical Sciences had appointed a Committee on Sanitary Engineering charged with assisting all branches of the Armed Forces on problems in sanitary engineering and allied health fields.

The Department of the Army requested 1) a critical review of the functions of its Division of Sanitary Engineering in relation to the prevention of disease and constructive suggestions for improvement; 2) advice in regard to certain special problems; and 3) the formulation of general

policies regarding sanitary engineering in the Army and including provisions for training personnel.

During World War II, the Committee was consulted by the armed services on a wide range of problems in environmental hygiene, such as: 1) Policies and standards for water supply and water purification and for sewerage and sewage treatment on military installations; 2) methods for the emergency disinfection of drinking water; 3) the adequacy of water purification methods in the prevention of amebiasis; 4) methods for the disinfection of contaminated vegetables and fruits to be consumed raw; 5) the sterilization of air to prevent the spread of bacterial and virus infections in hospitals; 6) the design of barracks to improve environmental health conditions; and 7) arctic sanitation, especially with reference to water supplies, waste disposal, and housing.

In 1946, upon a joint request from the armed services, the Committee on Sanitary Engineering was reconstituted; in 1947 it was reorganized and subcommittees were created to cover its expanding activities in environmental hygiene. Because of this

broad field of service the name of the Committee was changed to the Committee on Sanitary Engineering and Environment. The Committee now functions with seven subcommittees: Atmospheric and Industrial Hygiene, Food Supply, Personnel and Training, Shelter and Clothing, Vector Control, Waste Disposal, and Water Supply.

The present objectives of the Committee are: 1) to act as an advisory body to the Armed Forces and other federal agencies on problems which they propose; 2) to recommend or conduct studies on other problems uncovered in considering these proposals, or in fields as yet unexplored; 3) to apply the results of research to the solution of practical problems; and 4) to prepare from time to time educational information on sanitary subjects for general distribution to military and civil groups.

The rapid advance of technology, both industrial and military, is steadily increasing the complexity of our chemical environment. The toxicity of many substances present in our air, food, or water in small concentrations has not been adequately determined, and the hazards of new compounds proposed for use in warfare or industry are often unknown. As a result, the Committee and other advisory bodies are faced with a growing number of toxicological questions, many of which cannot be answered on the basis of existing knowledge.

During the past year a variety of problems of this nature have been considered. In an attempt to establish the study of air pollution on a sounder basis, the Subcommittee on Atmospheric and Industrial Hygiene has prepared reports on the status of current knowledge, standardization of units for measurement of air contaminants, and air sampling instruments for atmospheric and industrial hygiene surveys. It has also supported a proposal that the American Standards Association initiate studies on the performance of effluent air and gas cleaning equipment. Assistance was given to the Army in planning a contemplated study in Japan of a condition referred to as "Yokohama Asthma," presumably caused by atmospheric contami-

nants. Questions involving the toxicity of chemicals in drinking water have concerned the safety of plastic piping, the physiological effects of heavy chlorination, and the determination of safe limits of cadmium concentrations. The use of amines to control corrosion in steam lines serving food kitchens and autoclaves has also been under study. An interim report has been prepared on the effects of heavy chlorine concentrations, but further research will be required before definitive answers can be given to any of these questions. The possibility of injury from high voltage radiation in radar equipment is also under review.

More attention is being focused on the survival of pathogenic micro-organisms and viruses in nature. The increased use of lakes and streams for both water supply and waste disposal makes pollution a growing problem, and water shortages in many areas are leading to direct reuse of sewage plant effluents for irrigation and industrial purposes. This year the military services requested advice on related questions involving the disposal of infectious wastes and sewage from tuberculosis hospitals and other medical installations, and the use of the effluent for sprinkling lawns and golf courses. Following a panel discussion by the Subcommittee on Waste Disposal and a group of epidemiologists and virologists, it was concluded that further research was required on the survival of pathogens—especially the agents of tuberculosis, infectious hepatitis, and poliomyelitis—in effluents from treatment plants. Recommendations were also made concerning the need for chlorination of effluents at military posts. For several years the Subcommittee has been advising the Departments of the Army and Navy on studies designed to assess the hazards arising from the survival of pathogens in human wastes during cold weather, both under garrison and combat situations. In addition to reviewing protocols and reports, members have visited the experimental areas in the Canadian Arctic and the High Sierras to observe conditions during low-temperature training activities.

Problems have continued to arise in the

treatment of water derived from surface sources. The Subcommittee on Water Supply has issued a report to the Army on the maintenance of chlorine residuals at treatment points and in field supplies. It has proposed guiding principles on maintaining residuals in water distribution systems. Interim recommendations have been made on the maximum permissible rates of flow in rapid sand filters, a controversial subject of both economic and hygienic importance. The Subcommittee has also kept informed on the development of the membrane filter for rapid bacteriologic examination of water in the field, which has now reached a point at which definitive statements can be made regarding its utility. Recently the Subcommittee has been asked to study criteria for defluoridation of water at military installations and the use of trace concentrations of silver for the disinfection of potable water supplies.

In food sanitation, the growing use of vending machines on military posts and elsewhere has posed a number of problems, particularly when perishable foods are involved. Research has been initiated to determine the extent of the health hazards associated with sandwich-vending machines and whether they can be satisfactorily corrected. The Subcommittee on Food Supply has also been engaged in bringing up to date the widely circulated standards for machine dishwashing which it prepared some five years ago.

Questions have also been raised concerning the spread of infection by bedding, particularly in hospitals. Two specific questions are being explored: the need for sterilization of mattresses, and the value of adding mineral oil to bedclothes in laundering in order to suppress dust.

At the instance of the Subcommittee on Shelter and Clothing, the Departments of the Army, Navy, and Air Force have established a joint committee to plan and coordinate studies of heat injury to troops. It is hoped that the information obtained will serve as a basis for a simple but adequate manual to guide field commanders as to when activity should be curtailed, especially in training recruits. The Sub-

committee has been consulted also about a proposed revision of federal procurement specifications for salt tablets used by military personnel in hot environments.

Military housing is constantly presenting new problems because of the wide range of climatic and other conditions encountered. Recommendations have been requested on floor space requirements in barracks and on the advisability of air conditioning in certain types of military installations. The Subcommittee has assisted in a study of space requirements which has been in progress for some time at the Sampson Air Force Base. This will soon be augmented to include the psychological aspects of the problem. A report on air conditioning, containing recommendations on the effective temperatures required to assure reasonable comfort, has been completed.

Considerable attention has been given by the Subcommittee on Personnel and Training to problems concerning sanitary engineers in federal agencies. At the request of the Air Force, job descriptions for sanitary and industrial hygiene engineers have been reviewed with reference to conformity with professional engineering registration requirements. Recommendations have been prepared on graduate training of active-duty sanitary engineers at civilian institutions. The Secretaries of Defense and of Health, Education, and Welfare have been informed of the need for training sanitary engineering reserve personnel with the suggestion that it could be more effectively carried out through joint utilization of U. S. Army, Navy, Air Force, and Public Health Service resources and facilities. This recommendation is now being implemented by these departments.

The Committee emphasizes the importance of undertaking additional research in the following areas:

- 1) An exploration of the behavior of typical viruses, such as those causing poliomyelitis and infectious hepatitis, when subjected to high temperature or germicides, which is essential information in developing safe standards for the processing of foods, the disinfection of water, and the treatment of sewage and other wastes.

2) A study of the capacity of streams and other inland waters for handling low-level radioactive wastes from nuclear power reactors or fallout from atomic explosions. Further attention should be devoted to the removal of radioactive substances by water purification processes and the capacity of soils to remove these agents

from ground water.

3) Diligent support to the studies on the safe disposal and management of high level radioactive wastes.

4) A study of the toxicity of the chemicals present in small concentrations in air, food, and water to determine their effects on health.

## SCIENCE NEWS

### AUTUMN MEETING NATIONAL ACADEMY OF SCIENCES

Approximately 65 members of the Academy attended the autumn meeting held at the California Institute of Technology in Pasadena, November 2-4.

Fifty papers were presented in six scientific sessions, beginning on Wednesday morning, November 2, and continuing through Friday morning. Abstracts of the scientific papers were printed in *Science*, Vol. 122, pp. 873-882, and preprints were distributed to the members before the meeting.

The Academy met in business session on Wednesday afternoon to consider matters of policy, to receive formal reports, and to hear the President's account of major activities of the Academy and Research Council since the annual meeting of last April.

On Wednesday evening Richard P. Feynman, Professor of Theoretical Physics at the California Institute of Technology, delivered the public lecture on "The Value of Science." Professor Feynman selected three points for discussion: the first was the value of science as a key to knowledge and understanding. Pointing out that the same key can unlock doors leading to either good or evil, he concluded that this makes possession of the key no less valuable, although it emphasizes the necessity for mankind to look to its own moral instruction and discipline if the key is to be used for good.

Secondly, he defended as an important value of science the personal satisfaction

that the scientist finds in its pursuit. He described the scientist's sense of awe as he contemplates the vast "imagination of nature," presenting an endless challenge to his own imagination and his highest intellectual achievement in the effort to understand. He spoke of the thrill of scientific progress with its attendant opportunities to explore ground that has never before been accessible because the necessary foundation of knowledge has required centuries to accumulate.

Finally, Professor Feynman described the importance of doubt in science and stressed the value that science has because its progress demands insistence upon the right and responsibility of the individual to doubt, to question authority, and to recognize that certainty is never reached. Some of the world's worst ills, political as well as scientific, he pointed out, have stemmed from misguided persons or groups that arbitrarily selected "final" answers and treated doubt as inadmissible heresy. "It is our responsibility as scientists," he concluded, "knowing the great progress and great value of a satisfactory philosophy of ignorance, the great progress that is the fruit of freedom of thought, to proclaim the value of this freedom, to teach how doubt is not to be feared but welcomed and discussed, and to demand this freedom as our duty to all coming generations."

President and Mrs. Bronk of the Academy and President and Mrs. DuBridge of the California Institute of Technology greeted the members and their guests at a reception on Thursday evening before the Academy dinner. Professor Willis E.

Lamb, Jr., whose award of the Nobel prize in physics was announced during the meetings, and Mrs. Lamb were guests-of-honor at the dinner. President Bronk extended to Professor Lamb congratulations on behalf of the Academy and expressed the pleasure of the membership at the honor conferred upon Professor Lamb and the Academy through the award.

After the dinner, President DuBridge spoke on "Higher Education in Australia and New Zealand." He recounted the high points of his visit during the past summer to the major institutions of higher education of both Dominions. He described the organization, science curricula, and general problems of the university colleges, with their joint State-Federal financial support. He found the annual appropriations per student small compared with British and United States practice. He spoke of the movement that is growing in Australia and New Zealand to require more training in the humanities in scientific and technological curricula; the maximum required there now is about 6 percent of the student's time compared with an average of perhaps 20 percent in United States engineering and scientific schools. He spoke particularly of the first class research being carried on in universities there despite serious handicaps in obtaining necessary equipment in some fields, where important items are available only from the United Kingdom or the United States.

President DuBridge gave much attention in his remarks to the Australian National University in Canberra, supported entirely by Federal funds and limited to graduate study and research. He described the benefits to Australia that already are being realized from the close contact between scientists of the National University and the officials of government departments confronted with scientific problems.

The Ladies' Program included visits to the Huntington Library, Gallery, and Gardens, to the Los Angeles County Arboretum with its interesting "Queen Anne Cottage," and to the Pasadena Art Museum. The tour of the Arboretum was followed by a luncheon at the home of Professor and Mrs. Linus Pauling.

## PROGRESS OF THE EARTH SATELLITE PROGRAM

Joseph Kaplan, Chairman of the U. S. National Committee for the International Geophysical Year, has announced the appointment of a Technical Panel to direct and coordinate the scientific aspects of the Earth Satellite Program, whose genesis was described in NEWS REPORT, Vol. 5, No. 4, pp. 59-60. The members of the Technical Panel on the Earth Satellite Program are as follows:

R. W. PORTER, General Electric Company, *Chairman*  
HUGH ODISHAW, Academy-Research Council, *Secretary*  
H. E. NEWELL, JR., Naval Research Laboratory  
W. H. PICKERING, California Institute of Technology  
A. F. SPILHAUS, University of Minnesota  
LYMAN SPITZER, JR., Princeton University  
J. A. VAN ALLEN, State University of Iowa  
F. L. WHIPPLE, Smithsonian Astrophysical Observatory and Harvard University

The Panel, with additional membership and consultants, expects to utilize contributions from many scientists and institutions, a feature that has characterized the planning of all IGY programs under the auspices of the National Committee.

For logistic support, launching facilities, and experienced personnel, the U. S. National Committee turned to the U. S. Department of Defense. The Department's participation in the satellite program is being accomplished under the code name of Project Vanguard as a joint Army-Navy-Air Force program under Navy management. Scientists and engineers of the Department of Defense and those representing the Academy-Research Council, drawn from universities, government laboratories, and private research institutions, have worked in closest harmony in drawing up plans, performing the necessary preliminary calculations, and designing the satellite and propulsion vehicles. Substantial progress has already been made. Detailed plans are being developed for an extensive network of visual tracking stations along the path of the satellite. Two contracts for the manufacture of the units which will propel the satellite into its orbit have been awarded.

Present plans call for the construction of



approximately twelve instrumented satellites with the expectation that at least six will be successfully launched into their orbits, circulating about the earth for periods of two weeks to several months at heights between 200 and 800 miles. In planning the orbit and instrumentation of the satellites, the following types of observation are under consideration: 1) Determination of outer atmosphere densities by observation of the air-drag effect on the satellite's orbit; 2) obtaining more accurate measurements of the earth's equatorial radius and oblateness, intercontinental distances, and other geodetic data than are presently available; 3) long-term observations of solar ultraviolet radiation; 4) studies of intensities and fluctuations in intensity of the cosmic and other particle radiations impinging on the atmosphere; 5) determination of the density of hydrogen atoms and ions in interplanetary space; 6) observations of the Störmer current ring; and 7) if possible, determination of the distribution of mass in the earth's crust along the orbital track.

#### ANTIBIOTICS IN AGRICULTURE

The First International Conference on the Use of Antibiotics in Agriculture (*see* NEWS REPORT, Vol. 5, No. 5, pp. 83-84) was held in Washington, D. C., October 19-21. More than 400 registrants attended the scientific sessions. The foreign scientists in attendance included not only those invited to participate in the program, but others who came in response to the general invitation. Embassies and legations in Washington also sent representatives.

The scientific meetings were held in the Jefferson Memorial Auditorium of the U. S. Department of Agriculture. Each of the five half-day sessions was conducted as follows: Three or four reviews on selected topics were read by invited specialists, who together with other invited participants, then sat before microphones on the auditorium platform to discuss the results of the session. The panel discussion was followed by questions from the floor. At the end of each session an invited participant summarized the facts and opinions that had emerged.

The first session, on the afternoon of

October 19, was concerned with growth response in animals receiving feed containing antibiotics, and the second with special biological problems connected with the use of antibiotics in feeds, such as effects on reproduction and inheritance. The third session dealt with the means by which antibiotics exert their desirable effects on animals. The fourth session attracted much attention as it concerned a new use of antibiotics; namely, to increase the period during which unrefrigerated food can be kept without spoilage. In this session, also, the increasing use of antibiotics for the control of bacterial diseases of plants was discussed. The last session dealt with the public health aspects of the use of antibiotics on plants and animals.

Following the scientific sessions each day, the social events sponsored by Charles Pfizer and Company, Inc. and by Merck and Company provided additional opportunity for the visiting scientists to exchange views with those of the host country. The entertainment committee, under the chairmanship of George Briggs, arranged excursions to the University of Maryland, the Agricultural Research Center at Beltsville, and the historical spots near Washington.

The conference ended with a dinner for about 140 guests at the Statler Hotel. Following dinner, L. A. Maynard, Chairman of the Division of Biology and Agriculture, introduced representatives of the four supporting companies, each of whom responded briefly. Greetings were extended by W. E. Krauss on behalf of the Agricultural Board; by T. C. Byerly, Conference Chairman; G. W. Irving, Jr., on behalf of the U. S. Department of Agriculture; and by Henry Welch on behalf of the U. S. Department of Health, Education, and Welfare. Paul Weiss, Past Chairman of the Division of Biology and Agriculture, introduced the principal speaker of the evening, R. J. Dubos of the Rockefeller Institute for Medical Research. Dr. Dubos spoke on the history and philosophy of antibiotics.

Following the Conference, invited participants were guests of the four supporting companies on a 7-day tour of research laboratories and company farms where research in antibiotics was in progress.

## NAVAL TASK FORCE LEAVES FOR ANTARCTICA

The U. S. National Committee for the International Geophysical Year (IGY) has designated the following technical personnel to accompany Naval Task Force 43 which left the East Coast of the United States for Antarctica in November: Rochus Vogt, University of Chicago; and Edward E. Goodale, Kendall N. Moulton, Morton J. Rubin, Chesney E. Twombly, and Ernest A. Wood, all of the U. S. Weather Bureau. The primary mission of the Task Force, under command of Rear Adm. George Dufek, is the construction of the base at Little America, which will serve from January 1957 to January 1959 as the main base of operations for the United States IGY Antarctic program. Rear Adm. Richard E. Byrd, in overall command of United States Antarctic activities, and Paul Siple, Director of Scientific Projects and Environmental Living for the commander of Task Force 43, will join the expedition in New Zealand. The Sea Bee battalion accompanying the Task Force will also construct an Air Operating Facility at McMurdo Sound, which will serve as the focal point for all air operations. While the Task Force will leave the Antarctic during March 1956, some of the men will remain behind for the construction of stations at the South Pole and in Marie Byrd Land with the advent of the summer season in October 1956. During 1956-57, bases will also be constructed on the edge of the Weddell Sea and on the Knox Coast. Under the direction of Laurence M. Gould, Chairman of the National Committee's Antarctic Committee, and Harry Wexler, Chief Scientist of the IGY Antarctic program, scientists at these bases during the IGY will conduct studies in a number of geophysical fields.

Mr. Moulton and Mr. Twombly will remain for the Antarctic winter to gather preliminary data which will be valuable in setting up the scientific equipment and planning the schedule of observations to be followed during the ensuing two years. In particular, they will make visual observations of the aurora, visual and radar observations of meteors, and will participate in the program of meteorological observa-

tions to be carried out by Naval personnel. These two men will also travel with the construction crews who will erect the Pole and Byrd Stations and will take part in the transport of scientific equipment and supplies by air-drop to the Pole Station and by tractor train to the Byrd Station.

## CONFERENCE ON FOOD ADDITIVES

An international Conference on Food Additives sponsored jointly by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) of the United Nations was held in Geneva, Switzerland, September 19-22. Representatives of 13 countries and 4 international organizations attended. The United States delegation was composed of John L. Harvey, Deputy Commissioner of the Food and Drug Administration, *Chairman*; Eugene Jansen, U. S. Department of Agriculture, Paul Johnson, Academy-Research Council; and John F. Mahoney, Merck and Company.

The Conference convened to consider: 1) Whether and to what extent FAO and WHO could coordinate international activity in the general field of food additives; and 2) the desirability of assembling an expert committee for the purpose of formulating general principles governing the use of food additives. The discussions were confined to consideration of non-nutritive chemicals added intentionally to foods.

The Conference recommended that the following be undertaken:

1) The collection and dissemination of information on legislation concerning additives in the different countries, including information on changes in legislation.

2) The collection and dissemination of information on the physical, chemical, and biological properties of additives; on methods and justification for use; and on reasons for limitation of use, giving priority of consideration to a) food colors; b) preservatives, including antimicrobial agents and antioxidants; and c) emulsifiers.

3) Aiding member countries to coordinate research programs in order to get required information concerning food additives without undue overlapping and duplication of effort.

ACADEMY-RESEARCH COUNCIL  
LECTURE SERIES

The National Academy of Sciences-National Research Council opened the annual lecture series on Tuesday, November 15, when Paul A. Weiss, Member of the Rockefeller Institute, delivered the first lecture on "Engineering Principles in the Growth and Repair of Tissues." The second lecture was presented by William F. Albright, Chairman of the Oriental Seminary, Johns Hopkins University, on Tuesday, November 29. Dr. Albright spoke on "The Dead Sea Scrolls." A synopsis of Dr. Albright's lecture will be printed in a subsequent issue of NEWS REPORT.

LECTURE BY PAUL A. WEISS

On Tuesday, November 15, Paul A. Weiss, a biologist with an engineering background and a distinguished member of the Rockefeller Institute, presented the first lecture of the 1955-56 Academy-Research Council lecture series on "Engineering Principles in the Growth and Repair of Tissues."

Dr. Weiss described in a most interesting fashion studies carried out over more than twenty-five years on the structure of living tissues. Just as a bridge or house must be structurally sound to resist various forces acting on and within it, so it has been found that the living organism is structured according to sound engineering principles. The organism provides backbones or supporting frameworks on which biochemical processes take place and at the same time resists stresses and strains acting upon it. The mechanics of how this framework develops has been studied utilizing high magnification techniques as well as mechanical models.

If tissues such as tendons or arteries were not constructed to withstand strong pulls or pressure, disruption would take place. Observation of these tissues shows that they do in fact have a molecular and gross structure which conforms to basic engineering principles. If a randomly oriented meshwork of fibrin strands, such as is found in a blood clot, be subjected to a pull, the strands become lined up according to the lines of stress within the meshwork. Cells then grow along these strands adding

strength to the structure where it is most needed and thus become oriented along these internal lines of stress.

If expansion of an organ occurs in a randomly oriented meshwork of fibrils, there occurs a circumferential condensation of fibers around the growth thus developing a protective layer. Structures such as blood vessels, tubes, and ducts, gain strength in this fashion. When an organ shrinks, a radial arrangement develops among the surrounding fibers along which cells grow and become radially oriented. Thus growth engenders stresses, stress orients random meshworks, and cells grow along this oriented trellis following the lines of stress. Dr. Weiss was able to demonstrate in tissue cultures how growth and tensions operating on the "matrix" or "ground substance" translate themselves into cell orientation.

Many examples of the physical principles underlying such orientation were found by studying widely varying structures ranging from log jams in rivers to the flukes of a whale, the latter being a perfect example of the structure of an airplane wing. Bone canals, and even more so the basal membranes of the skin as seen under the electron microscope, are laminated like plywood; and tendons and muscles are constructed like ropes and cables.

The application of these principles to nerve sutures resulted in a markedly improved histologic picture of the regenerated nerve. The severed ends of the nerve were encased in an artery with a blood clot between the divided ends. Tension on the fibrin meshwork of the clot oriented the fibers of the mesh in the proper direction. White blood cells produced an enzyme which removed cross fibers. The regenerating nerve fibrils from the proximal stump of the divided nerve were then guided along the oriented fibers of the mesh resulting in an absence of the usual scarred bulbous neuroma at the site of a conventional type of suture. Dr. Weiss made a plea that these studies be extended to reparative processes in all tissues and that the investigator carrying out the work be aware of both fundamental and applied aspects of the task.



### SOVIET PROFESSIONAL MANPOWER

The National Science Foundation and the National Academy of Sciences-National Research Council are pleased to announce the publication of "Soviet Professional Manpower: Its Education, Training, and Supply" by Nicholas DeWitt of the Russian Research Center, Harvard University (see New Publications, p. 108). The study, based largely on published Soviet sources, was undertaken with the support of the Academy-Research Council and the National Science Foundation. It should prove useful to those who wish to obtain information about the role of the Soviet professional labor force. Information and data are given on the operational features of the Soviet educational system, factors affecting the quality of general and specialized education during the last three decades, and the supply of trained specialized manpower in the USSR.

### TRAINING PROGRAM FOR SCIENCE AND MATHEMATICS TEACHERS IN SECONDARY SCHOOLS

The National Academy of Sciences-National Research Council in cooperation with the American Association for the Advancement of Science and with the encouragement of major groups in business and industry is setting up a supplementary training program for science and mathematics teachers in secondary schools. This group is considered the most important segment of the American educational system, because largely upon them depends the interest and preparation of today's students who may be tomorrow's scientists, engineers, and technicians.

Arlington County, Va., is being used as a model for a pilot study on ways and means of improving the caliber of science and mathematics teaching in public schools. Other school systems in the Washington area have been invited to participate. School boards, parent-teachers associations, and civic groups are cooperating to raise a scholarship fund which will enable teachers to take graduate-level courses and familiarize themselves with both the fundamentals and recent developments in Sciences.

Another aspect of the plan provides qualified teachers with opportunities for summer employment in local scientific and engineering organizations in both industry and government.

On October 27, representatives of The George Washington University, University of Maryland, University of Virginia, American University, Georgetown University, Catholic University, Howard University, and District of Columbia Teachers' College met at the Academy-Research Council to develop a joint program of special courses in mathematics, physics, chemistry, and biology for the summer of 1956. A committee on the improvement of science and mathematics teaching, composed of representatives of the participating universities, is being formed to help coordinate the plans for this cooperative effort.

Responsibility for the general supervision of the entire program will be assigned by the Academy-Research Council to a special board representing all areas of science, mathematics, and engineering.

### POSTDOCTORAL RESEARCH ASSOCIATESHIPS

The Fellowship Office of the Academy-Research Council is again assisting the National Bureau of Standards and the Naval Research Laboratory in their research associateship programs. A new and similar program of associateships, inaugurated by the Argonne National Laboratory, will also be handled by the Fellowship Office.

The purpose of these postdoctoral research associateships is to provide young investigators of unusual ability and promise an opportunity for advanced training in basic research in the various branches of the biological, physical, and mathematical sciences, and in engineering psychology and visual psychophysics.

Postdoctoral research associateships are open only to citizens of the United States. Applicants must produce evidence of training in one of the fields listed above equivalent to that represented by the Ph.D. degree.

Research associateships are tenable only at the following laboratories: Argonne

National Laboratory, Lemont, Ill.; the National Bureau of Standards, Washington, D. C., and Boulder, Colo.; or the Naval Research Laboratory, Washington, D. C. The laboratories will provide the necessary facilities and equipment for the approved program of the Research Associate.

Appointments will be for one year with provision for a vacation period. The annual gross stipend will be \$6390 and will be subject to income tax.

Applications for the academic year 1956-57 must be postmarked not later than January 9, 1956. Awards will be made about April 1, 1956. Application forms and additional information may be obtained from the Fellowship Office, Academy-Research Council, 2101 Constitution Avenue, Washington 25, D. C.

#### GRANTS-IN-AID FOR SPECIALIZED MEDICAL RESEARCH

The Division of Medical Sciences is accepting applications for grants-in-aid of research for the fiscal year 1956-57 in three specialized fields:

1) Physiological, biochemical, and pharmacological effects of alcohol. The Committee on Problems of Alcohol has available a limited fund for the support of grants. Applications should be sent to the Committee and should be postmarked not later than January 15, 1956.

2) Mechanisms controlling sexual behavior in animals and man (including endocrinological, neurological, psychological, anthropological, phylogenetic, and genetic studies directed toward this problem). The Committee for Research in Problems of Sex will also consider requests that deal with the physiology of reproduction or with related biological and biochemical fields. Applications should be sent to the Committee and should be postmarked not later than February 1, 1956.

3) Analgesia and drug addiction. The Committee on Drug Addiction and Narcotics may have funds available for the support of research in these fields.

Further details and application blanks may be obtained from the appropriate committees of the Division of Medical Sciences.

#### FOREIGN RESEARCH SCIENTISTS PROGRAM

The Office of Scientific Personnel has announced the final group of awards made under the current program for Foreign Research Scientists which has been administered by the National Academy of Sciences (*see* NEWS REPORT, Vol. III, pp. 85-87, Vol. IV, pp. 60-61, and Vol. V, pp. 62-63). The following list of awards indicates the country of origin of the recipients as well as the field and location of their research.

##### From Austria

Johann Wiehart, Textile chemistry—North Carolina State College, with Malcolm Campbell.

##### From Denmark

Niels Arley, Biophysics—Yale University, with Ernest Pollard.

Jørgen Hermansen, Plant breeding—University of Minnesota, with J. J. Christensen.

Per Jonsson, Animal husbandry—Iowa State College, with J. L. Lush.

Igor Plesner, Physical chemistry—Columbia University, with Victor K. La Mer.

##### From France

Roger Klein, Cancer research—University of Texas Medical Branch, with C. M. Pomerat.

Marcel Gouge, Organic chemistry—University of South Carolina, with D. F. DeTar.

##### From Germany

Ernst Zebe, Zoology—University of Wisconsin, with W. H. McShan.

##### From the Netherlands

Jan de Boer, Algebraic geometry—Harvard University, with Oscar Zariski.

##### From Norway

Arnulf Persson, Plant genetics—University of California, with Charles M. Rick.

Knut Wasberg, Powder metallurgy—Stevens Institute of Technology, with Gregory J. Comstock.

##### From Portugal

Gabriel de Magalhães Silva, Agricultural entomology—Oregon State College, with J. S. Butts.

Augusto José Oliveira, Agricultural statistics—Iowa State College, with T. A. Bancroft.

#### CONFERENCE ON ELECTRICAL INSULATION

The twenty-fourth annual meeting of the Conference on Electrical Insulation was held at Pocono Manor Inn, Pocono Manor, Pa., October 17-19, with 203 registrants attending the technical sessions. The registration was somewhat lower than usual because of the severe flood damage in the area during the weekend preceding the Conference.

The twenty-five technical papers presented during the 3-day Conference were grouped under the following main subjects: breakdown, materials and applications, general and theoretical, and surface breakdown and deterioration. On Tuesday afternoon, October 18, John G. Kirkwood of Yale University presented the first J. B. Whitehead Memorial Lecture on "Dielectric Polarization of Polar Liquids." Dr. Kirkwood is Foreign Secretary of the National Academy of Sciences and a former active member of the Conference.

At the business meeting of the Conference on October 18, the following officers were nominated for 1955-56: A. H. Sharbaugh, General Electric Research Laboratory, *Chairman*; T. W. Dakin, Westinghouse Electric Research Laboratories, *Vice Chairman*; and E. R. Thomas, Consolidated Edison Company of New York, *Secretary*.

R. G. Breckenridge, Chairman of the Conference, read a letter from the General Electric Company inviting the Conference to meet next year at the General Electric Research Laboratory in Schenectady. The Conference accepted the invitation and the exact date will be set as soon as preliminary arrangements are completed.

#### RESEARCH ASSOCIATESHIPS IN MATHEMATICS

The Committee on Mathematics Advisory to the Office of Naval Research (ONR) announces that a small number of special postdoctoral associateships for research in such fields of mathematics as algebra, topology, foundations, and analysis will be offered during the academic year 1956-57 through contracts with ONR at the following universities: Brown University, Cornell University, University of Michigan, Tulane University, University of Washington, and University of Wisconsin. Appointments carry a salary of \$5,000 for the academic year. Applications for the year 1956-57 must be submitted by January 31, 1956, and the awards will be announced in March. Application forms and additional information may be obtained from Dr. Arthur Grad, Head, Mathematics Branch, ONR, Department of the Navy, Washington 25, D. C.

The present membership of the Committee on Mathematics Advisory to ONR is as follows:

S. S. CAIRNS, University of Illinois, *Chairman*  
L. V. AHLFORS, Harvard University  
A. A. ALBERT, University of Chicago  
M. H. HEINS, Brown University  
S. KAKUTANI, Yale University  
D. MONTGOMERY, Institute for Advanced Study, Princeton, N. J.  
I. NIVEN, University of California at Berkeley  
B. J. PETTIS, Tulane University  
J. B. ROSSER, Cornell University.

#### SMITH-MUNDT LECTURESHIP GRANTS

At the request of the Department of State the Conference Board of Associated Research Councils, through its Committee on International Exchange of Persons, has accepted the responsibility for recruiting candidates for lectureship grants being made under the International-Educational Exchange Program (Smith-Mundt Act). No grants for advanced research are being offered under the Smith-Mundt Act.

The countries participating in the exchange program for the academic year 1956-57 will include Argentina, Brazil, Chile, China (Taiwan), Colombia, Cuba, Ecuador, Egypt, El Salvador, Guatemala, Haiti, Honduras, Iceland, Iran, Israel, Korea, Lebanon, Mexico, Nigeria, Panama, Paraguay, Portugal, Spain, Sweden, Switzerland, Syria, Turkey, the Union of South Africa, Uruguay, and Yugoslavia. Most of these grants will be for 9-month periods, but several may be available for a single semester or summer session. The lecturers selected for appointments abroad receive grants in amounts approximating their usual salaries, a maintenance allowance, and transportation. The grants will be paid partly in dollars and partly in the currencies of the participating countries.

Applicants must be citizens of the United States and will be expected to have attained recognized standing as mature scholars in their respective fields and to have had at least one year of college or university teaching experience.

Because requests for visiting lecturers and professors arrive at intervals throughout the year, no program announcements are being made or applications invited.

Instead the Committee asks interested professors to register by filling out brief record cards obtainable upon request from the Committee. The Committee depends upon the Register of American Professors as its principal source of candidates for lectureships abroad and reviews all qualified registrants for appropriate openings.

Additional information and the record cards for the register may be obtained from the Committee on International Exchange of Persons, 2101 Constitution Avenue, Washington 25, D. C.

#### CONFERENCE ON HYPOTHERMIA

A 2-day conference on the "Physiology of Induced Hypothermia" was held at the Academy-Research Council on October 28 and 29. The conference, which was attended by some two hundred scientists and included twenty-six reports, was sponsored by the three military services and guided by the Subcommittees on Anesthesia, the Cardiovascular System, Shock, and Trauma of the Committee on Medicine and Surgery.

The origins of this conference can be traced to the reports by French scientists, starting about 1950, regarding the use of "artificial hibernation" as an aid to major surgery and the treatment of shock. The procedure involves administration of a complex "cocktail" of drugs combined with mild hypothermia. The possibility that this technique might be adopted for routine use by the forces of the North Atlantic Treaty Organization made it a matter of concern to the United States. H. Laborit, its chief exponent, was invited to present his views before a small ad hoc conference held by the Division in 1953, and visited several interested groups during his stay in this country. While the complex French technique has not been accepted by American investigators, research along related lines has been greatly intensified. Efforts have been made to define the specific effects of individual drugs used in the "lytic cocktail," and the physiology of hypothermia has received increased attention.

For many years surgeons have been aware of the advantages to be gained by

lowering body temperature, which reduces the oxygen requirements of the tissues, during operations in which the circulation must be interrupted. The same principle may obtain during shock, in which the circulation is poor. Practical advances have been made, particularly in the use of body cooling during heart surgery, but many problems have been encountered in maintaining the desired temperatures and in avoiding adverse effects on the heart itself. Not until recently have the physiological principles involved been subjected to intensive study. While progress has been rapid, the subject is so new and the approaches to it have been so varied that the results are frequently at variance and difficult to interpret.

The present conference was called in the hope of bringing diverse viewpoints closer together and giving the investigators a clearer orientation regarding the problem as a whole. While nothing approaching a synthesis of views was achieved, the exchange of ideas was a constructive step in that direction. It is hoped that publication of the proceedings, together with a projected critical summary of the findings to date, will help to carry the process further.

The conference was divided into sections on physiochemistry of hypothermia, its metabolic and systemic effects, tissue tolerances, methods of induction, and clinical aspects. A feature of the program was a motion picture presented by Audrey U. Smith of London and R. K. Andjus of Belgrade. In collaboration with J. E. Lovelock at the National Institute for Medical Research in London they had developed methods of cooling rats, hamsters, and monkeys to temperatures well below the point of cardiac arrest without apparent injury. Dr. Smith had succeeded in reviving hamsters even when substantial quantities of ice had formed in the tissues and body cavities. When supercooling occurred, without ice formation, hamsters recovered after reaching colonic temperatures of  $-5^{\circ}\text{C}$ . F. J. Lewis of the University of Minnesota also reported success in reviving monkeys cooled to temperatures as low as  $+5^{\circ}\text{C}$ . by similar techniques.



The following participants from abroad attended the conference:

- JACK ADAMS-RAY, Serafimlassarettet, Stockholm K, Sweden  
R. K. ANDJUS, Institute de Physiologie de la Faculté des Sciences, Université de Belgrade, Yugoslavia  
E. H. BOTTERELL, Toronto General Hospital, Canada  
A. C. BURTON, University of West Ontario, Canada  
JEAN CAHN, Paris, France  
E. J. DE LORME, Wilkie Surgical Research Laboratory, University of Edinburgh, Scotland  
D. DURRER, Amsterdam, the Netherlands  
R. O. HEIMBECKER, Toronto General Hospital, Canada  
J. A. HILDES, Director, Arctic Medical Research Unit, Canadian Defence Research Board  
I. K. R. McMILLAN, St. Thomas Hospital, London, England  
VICTOR WYNN, St. Mary's Hospital, London, England

#### FLOOR-CEILINGS AND SERVICE SYSTEMS IN MULTI-STORY BUILDINGS

On December 7 and 8 the Building Research Institute is sponsoring a research correlation conference on "Floor-Ceilings and Service Systems in Multi-Story Buildings." The central theme of the conference is integration of building structure and service systems for the most efficient performance of the multi-story building as an environment for human activity. The program for the conference has been divided into four sessions devoted to the following topics: Design for environment; the service systems (lighting, electrical, and air-conditioning); structural design; and the integration of design and construction. Architects, engineers, and contractors will be the principal participants before an audience composed of manufacturers of building products, designers, and builders.

John E. Haines, Vice President of the Minneapolis-Honeywell Regulator Company, will serve as conference chairman.

#### SYMPOSIUM ON HUMAN ENGINEERING, PERSONNEL, AND TRAINING RESEARCH

The Division of Anthropology and Psychology sponsored a joint U. S. Air Force-National Research Council Symposium on Human Engineering, Personnel, and Training Research on November 14-16. The

program of the Symposium was divided into six half-day sessions, each devoted to a special subject, and six members of the Division served as chairmen. The subjects and chairmen of the half-day sessions were as follows: 1) Human engineering, Frank A. Geldard, University of Virginia; 2) Personnel research, David A. Grant, University of Wisconsin; 3) Equipment maintenance and problem solving, Douglas H. Lawrence, Stanford University; 4) Group performance and systems research, Leonard Carmichael, Secretary, Smithsonian Institution; 5) Physiological psychology and tracking behavior, Meredith P. Crawford, Human Resources Research Office, The George Washington University; and 6) Psychomotor proficiency and trainer evaluation, Delos D. Wickens, Ohio State University.

#### STAFF APPOINTMENTS

The Advisory Board on Quartermaster Research and Development announces the appointment of **Frank R. Fisher** as Staff Chemist effective October 1, 1955, to replace **Frank Y. Speight**, who resigned in October 1954. Dr. Fisher received his Ph.D. degree in chemistry from the University of Pennsylvania in 1953 and was a Research Associate in the Department of Chemistry at the University of Rhode Island before coming to the Academy-Research Council.

**Robert W. Miller**, formerly head of the Pediatric Department of the Atomic Bomb Casualty Commission in Hiroshima, Japan has been appointed Acting Executive Director of the Committee on Atomic Casualties in the Division of Medical Sciences. Dr. Miller replaces **Frank H. Connell**, who resigned in October to become Technical Director of the Clinical Laboratories of the M. D. Anderson Hospital and Tumor Institute and Clinical Professor of Parasitology at Baylor University College of Medicine, Houston, Tex.

**Theodore C. Alford** was appointed Professional Assistant to the Committee on Growth. Dr. Alford was previously a fellow in surgery at Memorial Hospital in New York City.

## RECORD OF MEETINGS

### September

- 1 Committee on Regional Development of Mathematics, *Ann Arbor, Mich.*  
Subcommittee on Beef Cattle Nutrition, *Ames, Iowa*
- 4 Subcommittee on Pesticides  
Biology Council, Committee on Educational Policies, Subcommittee on Adult Education, *East Lansing, Mich.*
- 5-6 Biology Council, Committee on Educational Policies, *East Lansing, Mich.*
- 7 Ship Structure Subcommittee, Project Advisory Committee SR-131
- 8 Ad hoc Meeting on the Comparison of British and American Dextrans
- 8-10 Conference on Nuclear Geophysics, *State College, Pa.*
- 10-12 Conference on Disposal of Radioactive Waste Products, *Princeton, N. J.*
- 12 Committee on Brucellosis and Lep-  
tospiriosis
- 13 Ad hoc Panel on Death Certificate Study
- 15 Ad hoc Committee on Traffic Flow Theory, *Ann Arbor, Mich.*
- 16 Food Protection Committee, Subcommittee on Toxicology
- 20 Subcommittee on Shelter and Clothing
- 21 Titanium Process Review Committee  
Federal Construction Council, Task Group on Maintenance and Operation Problems Affected by Design and Construction
- 22 Second Conference on Procurement and Production of Rhesus Monkeys  
Institute of Animal Resources, Committee on Primates
- 23 Institute of Animal Resources, Governing Board
- 28-29 Metal Curtain Wall Conference
- 30 Committee on Parking and Its Relation to Business
- 30-Oct. 1 Committee on Drug Addiction and Narcotics

### October

- 1 National Committee, International Union Against Cancer
- 3 Subcommittee on Shock and Panel on Plasma, Joint Meeting
- 4 Subcommittee on the Cutaneous System  
Committee on Urbanization

- 5 Committee on Instrumentation, AASHO Road Test, *Detroit, Mich.*  
Subcommittee on Water Supply
- 6 Committee on Ship Steel  
Subcommittee on Waste Disposal  
Federal Construction Council, Task Group on Testing of Paints  
Committee on Containers, Subcommittee on Container Research, *Chicago, Ill.*
- 7 Committee on Sanitary Engineering and Environment
- 8 Division of Anthropology and Psychology, Executive Committee  
Division of Earth Sciences, Executive Committee  
Committee on Critical Tables
- 9 National Academy of Sciences-National Research Council, Governing Board  
National Science Foundation Postdoctoral Fellowship Evaluation Board for Second 1955 Award Period
- 10-12 Committee on Army Medical Education
- 10-13 Fourth National Clay Conference, University Park, Pa.
- 11-12 Committee on Maintenance of Concrete Pavement as Related to Pumping Action of Slabs, *Trenton, N. J.*
- 12 Committee on Mathematics, Advisory to the Office of Naval Research, *New York City*  
Committee on Ship Structural Design
- 12-14 Biology Council, Conference on Concepts, *Lee, Mass.*
- 13 Building Research Advisory Board, Advisory Committee on Washing Machines  
Federal Construction Council, Task Group on Waterproofing Masonry Walls
- 14 Panel on Sterilization of Blood and Plasma  
American Geological Institute, Executive Committee  
Committee on Naval Medical Research  
Committee on Growth, Section on Epidemiology  
Committee on Agricultural Equipment
- 15 American Geophysical Union, Executive Committee
- 15-16 Committee on Disaster Studies

16	Agricultural Board, Executive Committee		Subcommittee on Atmospheric and Industrial Hygiene
	Agricultural Research Institute, Governing Board		Ad hoc Conference on Carbon Monoxide in Aircraft
17-18	Annual Meeting, Agricultural Board and Agricultural Research Institute	24-26	Committee on Hearing and Bio-Acoustics
17-19	Conference on Electrical Insulation, Annual Meeting, <i>Pocono Manor, Pa.</i>	25	Statistical Committee on AASHO Road Test
18	Food Protection Committee, Subcommittee on Pesticides	25-26	Advisory Committee on International Technological Assistance and Panel on Survey of the Equipment Needs of Scientific Research Institutions of the Government of India, Joint Meeting
	Conference with School Board Members on Academy-Research Council Education Program		Committee on Photobiology, Conference on Photosynthesis, <i>Gatlinburg, Tenn.</i>
	Moderators for International Conference on the Use of Antibiotics in Agriculture	25-29	
19-21	International Conference on the Use of Antibiotics in Agriculture	26	Review Committee for Highway Research Board Award
19	Agricultural Research Institute, Conference on Pesticides		Committee on International Exchange of Persons
20	Committee on Instrumentation, AASHO Road Test	27	Ad hoc Meeting of Washington Area University Deans on Academy-Research Council Education Program
	Committee on Toxicology		Subcommittee on Shock
	Conference with School Board Members on Academy-Research Council Education Program		Subcommittee on Trauma
21	Subcommittee on Radiobiology	28	Subcommittee on Anesthesia
	Committee on Cancer Diagnosis and Therapy		Subcommittee on the Cardiovascular System
	Committee on Soils-Calcium-Chloride-Roads, <i>Charleston, W. Va.</i>	28-29	High Temperature Elastomer Group
22	Committee on International Relations in Anthropology, <i>Philadelphia</i>	29-31	Conference on the Physiology of Induced Hypothermia
24	Committee on Growth, Executive Committee		Biology Council, Committee on Educational Policies, Subcommittee on College Education, <i>St. Louis, Mo.</i>

## NEW PUBLICATIONS

All publications listed may be seen in the Library. Academy-Research Council publications may be ordered through the Publications Office; others may be obtained from the publisher indicated.

*Armed Forces Index of Occupational Health Methods and Equipment.* Washington, National Academy of Sciences-National Research Council, Division of Chemistry and Chemical Technology, 1955. 65 p.

Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics. *CHABA Second Annual Report . . . 1 June 1954-31 May 1955.* St. Louis, Mo., 1955. 21 p. (Available from: Office of the Executive Secretary, 818 South Kingshighway, St. Louis 10, Mo.)

*Associations and Societies of the Building Industry in the United States.* 1st ed. Washington, National Academy of Sciences-National Research Council, Building Research Institute, 1955. [46] p. Free to members of Building Research Institute; \$1.00 non-members.

Bascom, Willard. *Operation Green-Light, the Evacuation of Portland, Oregon, September 27, 1955.* Washington, National Academy of Sciences-National Research Council, Advisory Committee on Civil Defense, 1955. 12 p. Mimeographed.

Bascom, Willard. *Operation Alert, June 15, 16, 1955. Criticisms and Recommendations for the Future.* Washington, National Academy of Sciences-National Research Council, Advisory Committee on Civil Defense, 1955. 11 p. Mimeographed.

Bascom, Willard, and Brickner, Kenneth. *The Attack Warning System of the Metropolitan Washington Area, October 1, 1955.* Washington, National Academy of Sciences-National Research Council, Advisory Committee on Civil Defense, 1955. [41] p. Mimeographed.

- Bers, L., Bochner, S., and John, F., eds. *Contributions to the Theory of Partial Differential Equations. Papers . . . Read at the Conference on Partial Differential Equations Sponsored by the National Academy of Sciences-National Research Council, October 1952.* Princeton, N. J., Princeton University Press, 1954. (Annals of Mathematics Studies. No. 33.) 257 p. \$4.00.
- Conference on Electrical Insulation. Committee on Digest of Literature. *Digest of Literature on Dielectrics. Volume XVIII, 1954 . . . Edited by H. M. Philofsky and R. W. Crowe.* Washington, 1955. (National Academy of Sciences-National Research Council. Publication 383.) 176 p. \$3.00.
- DeWitt, Nicholas. *Soviet Professional Manpower: Its Education, Training and Supply.* Washington, U. S. Govt. Printing Office, 1955. 370 p. \$1.25. (Prepared under the direction of the Office of Scientific Personnel, National Academy of Sciences-National Research Council, and with the financial support of the National Science Foundation.)
- Eldredge, Donald H. *The Effects of Blast Phenomena on Man: A Critical Review.* St. Louis, Mo., Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics, 1955.
- (CHABA Report No. 3.) 24 p. (Available from: Office of the Executive Secretary, 818 South Kingshighway, St. Louis 10, Mo.)
- A Study of Slab-on-Ground Construction for Residences, Conducted by the Building Research Advisory Board for the Federal Housing Administration. Washington, National Academy of Sciences-National Research Council, Division of Engineering and Industrial Research, 1955. (National Academy of Sciences-National Research Council. Publication 385.) 50 p., illus. \$2.00.
- Underwater Physiology Symposium. *Proceedings . . . January 10-11, 1955, Washington, D. C. Loyal G. Goff, Editor.* Washington, National Academy of Sciences-National Research Council, Committee on Undersea Warfare, Panel on Underwater Swimmers, 1955. (National Academy of Sciences-National Research Council. Publication 377.) 153 p., illus. \$1.50.
- The WASHO Road Test. Part 2: Test Data, Analyses and Findings. Washington, 1955. (National Academy of Sciences-National Research Council. Publication 360. Highway Research Board Special Report 22.) 212 p., illus. \$3.60.

### Notice of Academy Meetings

#### NATIONAL ACADEMY OF SCIENCES

Annual Meeting, Washington, D. C., April 23-25, 1956

#### NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Governing Board, Washington, D. C., December 4, 1955

Governing Board, Washington, D. C., February 12, 1956

Governing Board, Washington, D. C., April 22, 1956

Governing Board, Washington, D. C., June 17, 1956



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*The search for Truth is in one way hard and in another easy. For it is evident that no one can master it fully nor miss it wholly. But each adds a little to our knowledge of Nature, and from all the facts assembled there arises a certain grandeur.*

—ARISTOTLE

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